

## CLAIMS

What is claimed is:

1. An isolated microorganism comprising a *Propionibacteria* strain selected from the group consisting of strains P169, P170, P179, P195, P261, and genetic equivalents thereof.
2. An isolated microorganism of claim 1, wherein the strain comprises strain P169.
3. A method of feeding a ruminant, which comprises feeding the ruminant an isolated microorganism comprising a *Propionibacteria* strain selected from the group consisting of strains P169, P170, P179, P195, P261, and genetic equivalents thereof.
4. A method of claim 3, wherein the ruminant is fed comprises strain P169.
5. A method of claim 3, wherein the ruminant fed is a bovine.
6. A method of claim 3, wherein the ruminant is fed the microorganisms such that the amount of microorganism delivered to the ruminant is about  $6 \times 10^9$  CFU to about  $6 \times 10^{12}$  CFU/animal/day.

7. A method of claim 7, wherein the ruminant is fed the microorganisms such that the amount of microorganism delivered to the ruminant is about  $6 \times 10^{11}$  CFU/animal/day.
8. A method of claim 3, wherein the ruminant is fed 17 g of a 1:10 mixture of the microorganism, which has been freeze-dried and which is at a concentration of  $3.5 \times 10^{10}$  CFU/g, and a carrier on a daily basis.
9. A method of claim 3, wherein the ruminant is fed the microorganism from -2 to 12 weeks postpartum.
10. A method of feeding a ruminant, which comprises feeding to the ruminant an isolated microorganism of the genus *Propionibacterium*,  
wherein the feeding of the microorganism increases at least one of energy balance, plasma non-esterified fatty acids levels, and plasma leptin level in the ruminant  
5 fed the microorganism when compared to the respective energy balance, plasma non-esterified fatty acids levels, and plasma leptin level in the ruminant when not fed the microorganism.
11. A method of claim 10, wherein the energy balance is increased.

12. A method of claim 10, wherein the plasma non-esterified fatty acids levels are increased.
13. A method of claim 10, wherein the plasma leptin level is increased.
14. A method of claim 10, wherein the microorganism fed comprises *P. acidipropionici* or *P. jensenii*.
15. A method of claim 14, wherein the microorganism fed comprises a *Propionibacteria* strain selected from the group consisting of strains P169, P170, P179, P195, P261, and genetic equivalents thereof.
16. A method of claim 15, wherein the *P. acidipropionici* fed comprises strain P169.
17. A method of claim 10, wherein the ruminant fed is a bovine.
18. A method of claim 10, wherein the ruminant is fed the microorganism at a level such that the ruminant is dosed daily with about  $6 \times 10^9$  CFU to about  $6 \times 10^{12}$  CFU/animal/day.
19. A method of claim 18, wherein the ruminant is fed the microorganism at a level such that the ruminant is dosed daily with about  $6 \times 10^{11}$  CFU/animal/day.

20. A method of claim 18, wherein the ruminant is fed the microorganism until populations of  $10^5$  to  $10^8$  CFU/ml ruminal fluid are established in the rumen.
21. A method of claim 10, wherein the ruminant is fed 17 g of a 1:10 mixture of the microorganism, which has been freeze-dried and which is at a concentration of about  $3.5 \times 10^{10}$  CFU/g, and a carrier on a daily basis.
22. A method of claim 10, wherein the ruminant is fed the microorganism from -2 to 12 weeks postpartum.
23. A method of enhancing the protein content of milk produced by a ruminant, the method comprising:
- (a) feeding an isolated microorganism of the genus *Propionibacterium* to the ruminant; and
- 5 (b) milking the ruminant to produce milk, the percent of protein in the milk produced by the ruminant fed the microorganism being greater than the percent of protein in milk produced by the ruminant when not fed the microorganism.
24. A method of claim 23, wherein the percent of fat in the milk produced by the ruminant fed the microorganism being greater than the percent of fat in the milk produced by the ruminant when not fed the microorganism.

25. A method of claim 23, wherein the percent of solids-non-fat in the milk produced by the ruminant fed the microorganism being substantially greater than the percent of solids-non-fat in milk produced by the ruminant when not fed the microorganism.

26. A method of claim 23, wherein the ruminant is fed the microorganism at a level such that the ruminant is dosed daily with about  $6 \times 10^9$  CFU to about  $6 \times 10^{12}$  CFU/animal/day.

27. A method of claim 26, wherein the ruminant is fed the microorganism at a level such that the ruminant is dosed daily with about  $6 \times 10^{11}$  CFU/animal/day.

28. A method of claim 23, wherein the ruminant is fed the microorganism from -2 to 12 weeks postpartum.

29. A method of claim 23, wherein the ruminant fed is a bovine.

30. A method of feeding a ruminant, the method comprising:  
feeding an isolated microorganism of the genus *Propionibacterium* to the ruminant, consumption of the microorganism effective to support production of a first milk by the ruminant, the first milk having a first protein concentration, the

5 first protein concentration greater than a second protein concentration in a second milk that is producible by the ruminant that has not been fed the microorganism.

31. A method of claim 30, wherein a percent of fat in the first milk produced by the ruminant fed the microorganism is substantially the same as in the second milk.

32. A method of claim 30, wherein the ruminant fed is a bovine.

33. A feed composition, the feed composition comprising:

(a) an isolated microorganism comprising a *Propionibacteria* strain selected from the group consisting of strains P169, P170, P179, P195, P261, and genetic equivalents thereof; and

5 (b) a carrier.

34. A feed composition of claim 33, wherein the *Propionibacteria* strain comprises strain P169.

35. A method of forming a direct fed, the method comprising:

(a) growing, in a liquid nutrient broth, a culture including an isolated microorganism comprising a *Propionibacteria* strain selected from the group consisting of strains P169, P170, P179, P195, P261, and genetic equivalents thereof ; and

5 (b) separating the microorganism from the liquid nutrient broth.

36. A method of claim 35, wherein the *Propionibacteria* strain comprises strain P169.
37. A method of claim 35, wherein the culture is grown to a level of about  $5 \times 10^8$  x CFU/ml to about  $4 \times 10^9$  CFU/ml.
38. A method of claim 37, wherein the culture is grown to a level of  $2 \times 10^9$  CFU/ml.
39. A method of claim 35, further comprising freeze-drying the microorganisms to form the direct fed.
40. A method of claim 39, further comprising adding the freeze-dried microorganisms to a carrier.